Reiki Therapy for Pain Management in Young Children Receiving Palliative Care

Allison Martin

Mentor: Dr. Susan Thrane

The Ohio State University College of Nursing

Abstract

Introduction: Chronic persistent pain impacts up to one in ten children, leading to difficulty completing activities of daily living and poor mental health. Studies in adults have suggested that Reiki therapy, a highly accessible form of biofield energy therapy, improves pain and other symptoms. Since research using Reiki therapy for children is minimal, this quasi-experimental pilot study aims to evaluate the feasibility and potential for benefit of administering Reiki therapy to children receiving palliative care.

Methods: Reiki therapy was administered to one to five year-old inpatients at a large children's hospital twice per week for three weeks. Sessions consisted of eight hand positions held for two minutes each. The faces, legs, activity, cry, consolability (FLACC) pain scale was used to measure pain pre and post each session. Parents completed a questionnaire each week during the study period, which included a report of their child's current pain level using a visual analog scale.

Results: The sample included five child-parent dyads at the time of abstract submission. The child sample consisted of three males and two females between ages 13 to 39 months, with a mean age of 26 months. The participants' age at referral to the palliative care service ranged from 0 to 4 months, with a mean age of two months. All mean pain scores decreased or were unchanged from pre-to posttreatment for each session, without statistical significance. However, a within-subject ANOVA test revealed a large clinical effect size of $\eta = 0.386$ for parent-reported decreased pain level.

Conclusions: Unchanged or decreased mean pain scores suggest that Reiki therapy reduced participants' pain, but small sample size and low incidence of nurse-reported pain hinder statistical significance. A large clinical effect size for parent-reported pain suggests that repeated

Reiki sessions decreased participants' pain over time. Overall, this study provides preliminary evidence that Reiki therapy may contribute to pain reduction in pediatric palliative care patients when used in conjunction with other complementary and traditional methods. It provides a methodological foundation for further research on Reiki therapy in pediatrics.

Reiki Therapy for Pain Management in Young Children Receiving Palliative Care

The World Health Organization (WHO) defines pediatric palliative care as "the active total care of the child's body, mind, and spirit…[Pediatric palliative care] also involves giving support to the family…[requiring] a broad multidisciplinary approach that makes use of available community resources" (WHO, 2017, p.13-17). It has been increasingly acknowledged that pediatric palliative care is just as necessary during times of aggressive medical treatment as it is during times of comfort care only. Palliative care promotes physical and psychological wellness for children who undergo treatment for serious illnesses or face complications related to congenital or genetic conditions.

While medical advances have increased the longevity of children who live with serious conditions, treatments may produce pain or clinicians may fail to address the pain adequately, in addition to other side effects. The families of children with serious conditions face fatigue, uncertainty, and stress. A bidirectional, direct relationship exists between the pediatric patient's pain level and the stress level of their parents, revealing how necessary palliative measures are to support wellness of the entire family unit. Pediatric palliative care "assists with medical decision making [and] reduces disease burden…helping families to maintain hope, regardless of whether the child dies" (Brown, 2015, p. 159). When instituted at the onset of a serious pediatric disease process, a palliative care plan supports the patient and family both in healthcare settings and at home, empowering them to focus on overall wellness at each moment. As a result, palliative medicine has been recognized as a criterion for ranking children's hospitals in *US News and World Report*, and the joint commission has created a palliative care certification for which children's hospitals can apply (Crane, 2011, p. 1433).

Pediatric palliative care often involves one or more forms of complementary and alternative medicine (CAM). Natural products such as herbs and vitamins are examples of CAM, as well as mind-body practices including acupuncture, massage, chiropractic manipulation, yoga, and meditation. Though it is less well-known than other CAM therapies in America, Reiki therapy is another mind-body practice which originates from Japan. In Reiki therapy, a trained practitioner places their hands on the recipient in a sequence of positions as the recipient relaxes, ideally by laying on a comfortable surface. The practitioner's role is to channel calming, healing energy to the recipient. For example, participants in a qualitative study reported experiencing "warm", "calm", "grounding", and "releasing" feelings during and after their Reiki treatments (Ring, 2009). While the mechanism of Reiki's impact is not yet fully explained, it is likely related to interaction between the practitioner's and participant's electrical and magnetic fields, also known as biofields. Each human cell produces electricity, and the heart and brain both produce their own electrical fields. The human body's electrical field produces a magnetic field, which has waves that interact with waves of another person's magnetic field at close range. When fields interact, some waves are cancelled while others are enhanced, which may begin to explain how touch therapy creates results (Thrane & Cohen, 2014). Physicists have discovered more to affirm the presence of biofields by detecting single small particles in more than one place at the same time, which was built on by Dr. John Zimmerman's detection of a biomagnetic field coming from the hands of a healing practitioner. Such breakthroughs in quantum physics show that humans can produce similar pulsating biofields to those that are used for chronic pain management in transcutaneous electrical nerve stimulators (TENS), suggesting a mechanism of action for Reiki therapy that requires further investigation.

Globalization and therapeutic results have caused Reiki to gain popularity in western culture not only as a stress-reduction technique, but as a method of decreasing the psychological distress that occurs in times of pain and illness. Thus, Reiki has emerged as a form of biofield therapy in the realm of complementary medicine and health-related research. Reiki therapy is a highly accessible CAM method for people of all demographics, including young children. It does not require the recipient to have any specific abilities, uses no equipment, and can be taught to caregivers in any quiet setting. However, few studies related to the use of Reiki therapy with young children have been performed, despite the fact that over half of children in palliative care programs are under three, and they often use other alternative mind-body therapies (Crane, 2011).

By examining the results of Reiki therapy use in pediatric palliative care patients, we seek to expose the extent of Reiki's potential to be embraced as an effective, inexpensive, portable, and family-benefitting method of improving quality of life for that population.

Significance of Problem

To understand the purpose behind inquiry into Reiki therapy's impact on pediatric palliative care patients, one must understand the prevalence and significance of chronic pain in children. In recent decades, pain recognition and relief has gained priority in America's healthcare delivery system, with the 2010 Patient Protection and Affordable Care Act requiring the Department of Health and Human Services to plan an examination by the Institute of Medicine (IOM) of pain as a public health issue (National Academy of Sciences, 2011). *Relieving Pain in America,* the report which resulted from that inquiry, revealed that chronic pain causes clear, pathological changes in the nervous system. Thus, chronic pain can be considered its own illness, which notably carries a cost of $560-635 billion annually in the United States

(Institute of Medicine [IOM], 2011, p.1). That cost accounts for chronic pain in adults only, costing more than heart disease and cancer in America combined. Slightly under half of chronic pain's cost represents the cost of pain treatment, while the rest represents lost productivity (IOM, 2011, p. 1). While such findings make a strong case for improving pain management in adults, the IOM's report states that the problem has not been researched to its complete extent.

Chronic pain is underdiagnosed among certain populations, including children (IOM, 2011, p.2). Existing studies reveal that pediatric pain is prevalent and that lack of pain control in children can cause short and long-term negative effects. A shift in medical attitudes toward pediatric pain management started in 1977, when a report by Eland and Anderson (1977) found immense disparities in children's pain management compared to that of adults'. At the time, postoperative and procedural pain were rarely prioritized through any diagnosis or treatment at all (Palermo 2013, p.93). Following dissemination of those findings, it was considered a humane duty for the medical community to assess and treat pediatric pain with the same diligence as adult pain, creating the opportunity for researchers to examine the concept further. Today, according to Suresh and Shah's (2014) *Pediatric Chronic Pain Management* (2014), five to ten percent of children experience chronic persistent pain (Suresh & Shah, 2014, p.449). Frequent causes of such marked pain in youth include neuropathies, migraine headaches, chronic illnesses such as sickle cell disease and cystic fibrosis, recurrent abdominal pain, dysmenorrhea, and cancer (p.449). Furthermore, untreated chronic pain in children causes the same nervous system changes that occur in adults, which can lead to lifelong hypersensitive pain perception (Fitzgerald & Walker, 2009).

While chronic pediatric pain is discussed as generally undesirable, it affects each child differently, with negligible to severe impacts on numerous aspects of daily living. Some studies

classify children with chronic pain as high or low-functioning, and Reid (2010) explains that pain-associated disability syndrome occurs in one to three percent of children. The syndrome is demonstrated by severe functional impairments regardless of pain cause and location, which are not explained by other conditions (Reid, 2010, p. 158). Since childhood is a crucial time of development, those who are disabled by chronic pediatric pain may fall behind in motor skills, academics, self-care, and socialization. Anxiety and avoidance behavior may also develop in children with chronic pain, making them less likely to engage in already-challenging functional skills (Suresh & Shah, 2014, p.449). Thus, uncontrolled chronic pain puts children at risk for loss of functional status through a combination of physical discomfort and anxiety. As such risk has become widely recognized, overall quality of life has been studied among pediatric chronic pain patients, and one study found that "quality of life of children with recurrent headaches is similar to that of children with rheumatoid arthritis or cancer" (Suresh & Shah 2014, p.250), revealing that chronic pain reduces quality of life as an isolated condition, whether or not it is associated with a life-threatening diagnosis.

Since chronic pain comes in numerous varieties which all put children at risk of multifaceted suffering and impairment, part of practitioners' relief efforts involve an increasing amount of opioid analgesic prescriptions. As pediatric pain became more widely recognized and opioid use in adults was deemed relatively safe, pediatric medical opioid prescriptions doubled, extending to chronic conditions and home use increasingly often (Palermo, 2013, p.94). However, the safety and efficacy of opioids in pediatrics has since been called into question by researchers, practitioners, and community members. Effects on rapid pediatric brain development must be taken into account when prescribing opioids long term, and providers are inconsistent in determining end points of treatment (Palermo, 2013, p.94). Based on an

understanding that pain cannot always be relieved through opioids alone and that their use produces risk, research on non-pharmacologic pain relief and environmental influences on pain has emerged. The existing body of research targeting familial interactions of children with chronic pain suggests that children may cope maladaptively when they receive increased parental attention related to pain (Palermo, 2013, p.93). For example, children with recurrent abdominal pain may experience increased symptoms when their guardians outwardly focus on the pain (Walker & Zeman, 1992, p.49). Since "parents of children with chronic pain report increased parenting stress, anxiety, and depressive symptoms" (Palermo 2013, p.93), a pattern of bidirectional rumination on pain between parent and child is likely to occur.

Pediatric chronic pain impacts up to one in ten children, and disabling chronic pain is present in one to three percent of children. Pain decreases children's functioning, threatens quality of life and mental health for the child and family, and poses a challenge regarding safe, yet effective use of pharmacologic analgesia. Thus, a body of research on non-pharmacologic methods of pediatric pain management is building. For example, studies have demonstrated that distraction techniques can effectively reduce procedural pain in toddlers and preschoolers (Thrane, 2016, p.e27-28). Since families have an impactful influence on children with chronic pain, benefits may stem from involving them in alternative pain-reduction techniques, whether they administer therapies or simply encourage them. Such a process may divert parental attention away from anxious overprotection and rumination on pain, redirecting it to a low-risk, caring practice that reduces pathologic feelings for all involved. Thus, this study seeks to determine whether Reiki therapy may be an effective non-pharmacologic method for such pain reduction.

Literature Review

This literature review aims to determine how Reiki therapy has already been examined as a method of complementary therapy which may influence humans' psychological and physiological states. Though this study evaluates Reiki therapy's ability to reduce pain in hospitalized children between the ages of one to five years, the parameters of the literature review are much more general because existing research on the effectiveness of Reiki therapy, particularly in children, is scarce. Nonetheless, the small body of research on Reiki therapy reveals its potential to be supported as clinically beneficial in future studies. Existing studies provide insight into the functions and populations for which Reiki may be effective, and reveal how relevant research methods can be strengthened.

In a survey of parents whose children were receiving care at an inpatient acute pediatric rehabilitation unit, Rybczynski et al. (2016) sought to examine factors influencing caregivers' decisions to accept or decline complementary therapy. The survey asked parents about their reasons for accepting or declining massage, energy therapy, and acupuncture for their children, and the extent to which they believed complementary therapy was helpful in general. While energy therapy is not identical to Reiki therapy, its approach is similar, and worth examining for insight into how parents perceive touch therapy. At the facility in which this study was conducted, energy therapy involves "channeling healing energy through the hands of a practitioner into the client's body to restore a normal energy balance and health" (Rybczyksi et al., 2016, p. 103). Demographic questions, including some about the parents' religious backgrounds and familiarity with complementary therapy, were also asked. Researchers found that 55% of the parents recalled being offered complementary therapy for their children, and 49% chose to accept energy therapy. However, parents who participated in religious services were significantly less likely to accept energy therapy than other parents. The most common

reason for accepting energy therapy that parents reported was “I am willing to try anything to help with [my child’s] recovery”, and the most common reason for declining energy therapy was “I don’t know enough about it” (Rybczynski et al., 2016, p.104). Overall, Rybczynski et al.’s survey reveals that energy therapy is often stigmatized as a complementary therapy method simply because few people know what it entails. Some may misconceive that it involves religion or refers to higher powers. Such information is useful to this study, as Reiki therapy also involves hand positions and energy transfer, making it susceptible to the same stigmatizations as energy therapy. Future research on therapeutic use of Reiki therapy may be compromised if patients and caregivers are not first given comprehensive information on what it entails.

A case study published by Bukowski and Beradi (2014) serves as a compelling examination of how Reiki therapy may be beneficial in the home setting. The case study’s subjects were a mother and her nine year-old daughter, who experienced unprovoked seizures related to perinatal stroke with minimal sequalae. For six weeks, the child received twice-weekly, twenty-minute Reiki sessions administered by her mother, who was a certified Reiki practitioner. The mother kept a log of her child’s sleep patterns during the study period, and the child completed a self-report questionnaire before the first session and after the last to evaluate her relaxation. The child also completed a global questionnaire at the study’s conclusion, which evaluated her overall experience with Reiki sessions and perception of how Reiki impacted her quality of life. Finally, the mother completed a self-report which measured her stress before the first Reiki session and after the last. The authors found that both the child and mother experienced significant decreases in stress from the beginning of the study to the end, and that the child experienced positive change in sleep patterns on 33.3% of nights during the study period. However, the child reported no overall change in quality of life. It must be acknowledged

that since the results of all case studies are specific to the individuals studied, they cannot be generalized. It is impossible to know from this examination whether or not other children may benefit from Reiki therapy. Though the mother agreed to maintain her daughter's normal routines and environment during the study period, researchers had no means of controlling extraneous variables. This case study also involved potential for self-report bias, which was even more likely due to the mother's role as a Reiki provider. Though the variable of sleep that this case study examined is more objective, there was no sleep data taken before the study other than the mother's claim that the child "previously awakened at two or three AM on most nights" (Bukowski & Beradi, 2014, p.255). Thus, the child's sleep patterns during the case study were being compared to a general claim, and may have been subject to measurement error because they were taken by the mother using no sleep monitoring equipment. Overall, this case study does not provide scientifically reliable evidence that Reiki therapy is beneficial. However, it serves as an example of how Reiki therapy may holistically improve the well-being of patients and caregivers in the home setting, suggesting that future research on caregiver-administered Reiki is warranted.

A systematic review conducted by Lee et al. (2008) examines Reiki therapy from an experiment-based perspective. The authors review nine randomized control trials which evaluate Reiki's effects on depression, anxiety, pain, and stress in clinical settings. All studies used an experimental group of participants who received Reiki therapy. All participants were adults, and the study populations included cancer patients, perioperative patients, patients with diabetic neuropathy, and chronically ill patients with pain and/or depression. For the control group, some studies used a sham Reiki placebo, while others instructed control participants to rest for the same length of time as the Reiki session. Lee's research team found no statistically significant

data to support Reiki as an effective treatment for any condition, but two trials suggested benefits for depression, and one suggested benefits for pain and anxiety. While this review is stronger than other studies in sample size, with a total of 508 participants, four of the studies used no blinding techniques. Patients in those studies who received Reiki therapy may have been biased by their knowledge of being in the intervention group, as well as having preexisting perceptions of Reiki. Furthermore, the sample sizes of individual studies were small, making it difficult to generalize any study's results to a broader population. Study designs varied widely in the number and timing of Reiki sessions conducted, making it difficult to determine whether Reiki provided more benefits for acute relaxation or well-being over multiple sessions and weeks. While this systematic review does not lead to significant evidence of Reiki's effectiveness, it provides foundational knowledge of the methods by which future studies may be designed to produce stronger, more reliable data. If any one of the randomized controlled trials in this systematic review was repeated with larger sample sizes and double-blinding, stronger conclusions could be drawn regarding Reiki's effectiveness for specific purposes, populations, and time periods.

A randomized controlled trial conducted by Bowden et al. (2010) investigated Reiki's influence on psychological well-being and salivary cortisol in 35 healthy undergraduate psychology students. Participants were randomly divided into two groups using a single-blind design, and were subjected to ten laboratory sessions over 2.5 to 12 weeks. All participants wore blindfolds and headphones during the sessions. The experimental participants received Reiki therapy from a practitioner standing behind them, while control participants were subjected to a researcher standing stationary behind them. All participants completed an illness symptom questionnaire as well as depression, anxiety, and stress self-report scales 10 minutes before and after each session. Bowden's team analyzed both pre and-post session data as well as

longitudinal data, discovering that participants in the Reiki group had a tendency toward illness symptom reduction over the course of the study period (Bowden et al., 2010, p.66). The non-Reiki group experienced a significant increase in illness symptoms during the study period (Bowden et al., 2010, p.66). Researchers used pre/-post session data to assess comparative stress reduction between the two groups, and found that participants in the Reiki group experienced a near-significant comparative stress reduction (Bowden et al., 2010, p.66).This study is stronger than many previous studies involving Reiki therapy because it uses single-blinding, which was verified as successful by a survey asking participants whether or not they could determine their group assignment. Researchers surveyed participants about their prior knowledge of Reiki therapy, and controlled for that variable in data analysis. However, ability to generalize this study's findings is limited by a small sample size. Researchers also only examined healthy undergraduate psychology students, limiting the ability to generalize results to other populations.

Bowden et al. recognized that participants in the Reiki group had far worse baseline illness symptoms than the control group, leading them to publish a similar study in 2011. The authors recruited 40 undergraduate students as participants and conducted the same procedure as in the previous study, but this time sought to examine anxiety and depression as dependent variables. Participants were recruited so that 20 with high anxiety and/or depression scores were included in the study, and 20 with low scores were included. The Reiki group and control group each had 10 students with high psychopathology measures and 10 with low measures. Researchers found that participants in the Reiki group with high baseline depression and/or anxiety experienced a progressive improvement in mood throughout the study period, while no change was seen in controls who received Reiki (Bowden et al., 2011, p.1). However, although Bowden et al. again included the illness symptoms questionnaire, this time the Reiki group did

not have a comparatively greater reduction in illness symptoms. The fact that such a replication produced different results for the same variables reiterates the need for further randomized controlled trials that examine Reiki therapy using larger sample sizes.

Finally, a pilot study conducted by Thrane et al. (2016) sought to examine "feasibility, acceptability, and the outcomes of pain, anxiety, and relaxation using Reiki therapy with children receiving palliative care" (p.373). Sixteen parent-child dyads were recruited from a pediatric palliative care center, and each child participant received the intervention of two 24-minute Reiki sessions in their own home. Seven of the children had been diagnosed with cancer, while four had a congenital condition and five a genetic condition. All sessions were administered by a Reiki practitioner who also had pediatric nursing experience. Measures of heart rate and respiratory rate as well as pain and anxiety scales were recorded immediately before and after each Reiki session. The FACES® Scale and Children's Fear Scale were used to measure pain and anxiety, respectively. Verbal children completed those scales for themselves, while the same scales were completed by a parent for nonverbal children. After analyzing data, researchers found that while mean scores decreased for all outcome variables from pre-to post-session, few were statistically significant. There was a statistically significant pre/-post session decrease in respiratory rate among verbal and nonverbal children, and a significant decrease in pain among nonverbal children. Both of those significant effects only occurred in the second Reiki session rather than the first, suggesting that children may see increasing benefits from Reiki therapy as they become more familiar with it. Similar to other studies that examine Reiki therapy, this study used a small convenience sample, limiting the generalizability of results. Furthermore, participants' responses to Reiki therapy may have been impacted by the home environments sessions were conducted in, and by the presence or absence of a parent. The principal

investigator was also the interventionist who conducted Reiki sessions and measured vital sign outcomes, introducing potential bias. However, this research is particularly relevant because it examines the population of pediatric palliative care patients, and objective physiologic data is used to evaluate Reiki's effectiveness in addition to self-report scales. The significant changes that occurred in this study during participants' second Reiki session reveal that further inquiry, using a longer-term Reiki therapy program, is warranted.

Overall, existing research suggests that Reiki therapy may decrease pain, stress, and illness symptoms among adults. The body of research on Reiki therapy in pediatrics is less developed, but suggests that Reiki is feasible for use in children, with potential to benefit numerous aspects of pediatric wellness. This study contributes to that emerging body of research by examining Reiki therapy's impact on pain in young children.

Methods

The inquiry described in this paper focuses on pain, but is also part of a larger, ongoing study, which is described to provide full understanding of the methodology used. The ongoing study will be referred to as the parent study, indicating that the pain study discussed in this paper was conducted within it. It must be acknowledged that the phrase "parent study" does not represent parents of the study's child participants.

The parent study's purpose is to evaluate the feasibility and potential for benefit of administering Reiki therapy to young hospitalized children, ages one to five, who are receiving palliative care. Its first aim is to evaluate the effects of Reiki therapy on pain, heart rate, respiratory rate, oxygenation, medication use, and quality of life of hospitalized children receiving palliative care over a six-week study period. In addition, the parent study aims to evaluate participants' physical, psychological, and social reactions to Reiki therapy as observed

by parents and hospital staff members. The parent study's final aim is to use heart rate variability in the exploration of children's stress and relaxation responses to Reiki therapy.

Using data from the ongoing parent study, the inquiry described in this paper aims to evaluate the effects of Reiki therapy on pain with hospitalized one to five-year old children receiving palliative care. This section describes the pain study's sampling, data collection, and data analysis methodology, then describes additional methodology used to collect data for the parent study.

Study design and sampling

This investigation of Reiki therapy's effects on pain was a quasi-experimental pilot study using a single group of subjects, who were studied using a pre-post intervention design. The ongoing parent study seeks to recruit a convenience sample of 20 children, ages one to five, who are receiving palliative care and experiencing long-term hospitalization during the study period. The pain study used a sample of five children from that population. All participants were patients at Akron Children's Hospital's Haslinger Family Pediatric Palliative Care Center. Children were excluded from participation if they were critically ill, expected to be discharged from the hospital within three weeks of the start of data collection, or were to turn six years old before the end of the study period. The palliative care center's patient census was evaluated each day during the study period for eligible patients, whose parents were then approached by a member of the research team. After verbal and written information about the study was provided, informed consent was obtained from parents who chose to provide it. Following informed consent, a parent of the participating child completed a demographic form indicating the child's age, sex, race, religion, diagnosis, length of palliative care, present pain medication use and dosage, and parent age, sex, religion, education level, total family income, and parental employment status.

At this time, parents also completed a Perceived Treatment Efficacy Scale (PTES), which was used in the parent study to evaluate the extent to which parents considered Reiki an effective therapy method before the experiment. The PTES scale has a Cronbach α of 0.97, and has been validated in studies involving numerous populations.

Measures and Data Collection

The Reiki intervention period was three weeks long, and a follow-up was conducted three weeks after its completion. During the intervention period, Reiki therapy was administered to each participant for 17 minutes, twice per week, with at least two days between sessions. Each session was conducted by one of five professional Reiki providers, all of whom had over six months of Reiki experience and three months of experience working with ill children. To ensure consistency, the PI trained and evaluated all Reiki providers in conducting the protocol for this study. Sessions included eight hand positions, held for two minutes each, with one minute of relaxation time before the first position. Reiki therapy was conducted in each child's hospital room, with or without guardian(s) present based on family preference and allowed by the informed consent process for child subjects.

Several quantitative measurement methods were used to analyze participants' pain. Ten minutes before and after each Reiki session, each child's pain was assessed by the child's regular nurse using the FLACC pain scale. The FLACC scale has good construct validity for measuring pain in children, using a homogeneous observational scoring mechanism (Malviya et al., 2006, p.263). In Manworren and Hynan's (2003) study of the FLACC scale's validity in preverbal children, nurses assessed each patient's FLACC score, then gave an opioid analgesic or non-opioid analgesic based on their assessment of the patient's pain level. Pre-analgesia FLACC scores were significantly higher for children who were given opioids than those who were not,

and post-analgesia FLACC scores across analgesia groups were not significantly different (p. 140). In a study of the FLACC's validity for children with cognitive impairment conducted by Malviya et al. (2006), good interrater reliability (interclass correlation coefficients = 0.76-0.90) was demonstrated, as well as good criterion validity based on correlations between FLACC, parent, and child-reported pain scores ($p = 0.65\text{-}0.87$, $p < 0.0001$) (p.258). Good construct validity was demonstrated by a decrease in FLACC scores following analgesic administration (6.1 ± 2.6 vs 1.9 ± 2.6, $p < 0.001$) (Malviya 2006, p. 258). Overall, the FLACC scale's validity has been strongly demonstrated for the participants in this study who are unable to self-report pain and/or have cognitive impairment.

Children who were 4-5 years old and had the ability to self-report their pain also completed the FACES® pain scale. The FACES® scale has been consistently validated since the 1980's for use in children with chronic pain, and more recently for use in children with acute and procedural pain (Garra et al., 2010, p.50).

The final pain assessment tool used in this study was a visual analog scale, which parents used to rate their child's current pain level. The visual analog scale was a straight line, 10 centimeters long, with a label on its left end reading "baseline" and a label on its right end reading "most pain". Parents marked an "x" on the line to indicate the child's current pain level. The pain visual analog scale was part of a parent questionnaire created specifically for the parent study, which is discussed later. Parents completed the questionnaire at the time of informed consent, and then weekly, plus or minus one day, beginning a week after the start of Reiki sessions.

In addition to the assessment tools used in this focused pain study, other methods of data collection were conducted for use in the parent study. Vital sign measures were taken by a staff

RN immediately before and after each Reiki session, with heart rate and oxygenation assessed using an electronic monitor and respirations counted for thirty seconds and multiplied by two to calculate respiratory rate. Heart rate variability was measured using a Holter monitor during the first, fourth, and sixth Reiki sessions. In order to minimize confounding effects that wearing the Holter monitor patches may have on participants' pain and vital signs, the monitor was attached to each child 20 to 30 minutes before the session. If the child showed no signs of discomfort or distress after wearing the Holter monitor for 10 minutes, a 10-minute baseline heart rate variability data collection was initiated. Following that, experimental heart rate variability data was collected during the first two and last two minutes of the session. If a participant showed signs of discomfort or refusal during lead placement, the Holter monitor was not used for that Reiki session.

The parent study also collected data using several observational and parental-report scales. As mentioned earlier, a parent child observation questionnaire was formed for use in this study, as well as a similar questionnaire for staff members. Those questionnaires allowed parents and staff to evaluate the effects of Reiki therapy on participants' interactions with family members and staff, participation in activities, ability to play, and mobility. As previously stated, parents completed this questionnaire at the time of informed consent, and then weekly, plus or minus one day, beginning a week after the start of Reiki sessions. Staff members who interacted with participants regularly were asked to fill out the scale in the same weekly pattern as parents, but without the initial report before Reiki began. Those staff members included RN's, child life specialists, nursing support staff members, physical therapists, and occupational therapists.

In addition, parents completed the PedsQL Short Form Generic Core Scale at the time of informed consent, after the child's last Reiki session, and at a follow-up visit three weeks after

the last session. The PedsQL scale examines quality of life in children as reported by their parent. It has demonstrated responsiveness, construct validity, and predictive validity in hospitalized pediatric patients between the ages of one month to 18 years (Desai et al., 2014, p.1114). Questions on the PedsQL vary based on age group, so this study used the infant PedsQL for ages 13-24 months, the toddler PedsQL for ages two to four years, and the child PedsQL for ages five to seven years, in accordance with each participant's age. At the post-experiment follow-up visit, parents completed the Perceived Treatment Efficacy Scale a second time, as well as the Patient Reported Outcomes Measurement Information System (PROMIS) survey at the time of informed consent, after the last Reiki therapy session, and at follow-up. The PROMIS-29 evaluates the parents' health, evaluating symptoms of depression, anxiety, physical function, fatigue, sleep disturbance, pain interference, and ability to participate in social roles and activities. Finally, parents completed a brief interview about their subjective experience with the study at follow-up.

Data Analysis

During this focused pain study's data analysis process, the child served as the unit of analysis. Descriptive statistics were used to evaluate the data distribution, identify outliers, determine the balance of baseline measurements, and report quantitative outcome measures taken with each therapy session. For each session, a paired t-test was conducted to determine the difference in change in FLACC pain scores from pre- to post-session. One-way ANOVA tests were performed to test the significance of longitudinal changes in outcome measures and determine clinical effect size. The one-way ANOVA was conducted using participants' FLACC pain scores, as well as their parent-reported pain scores.

Results

The sample included five child-parent dyads. One participant became critically ill and could not complete all Reiki sessions, creating a 20% attrition rate. Demographic data for child and parent participants is included in Table 1.

Table 1. Child and Parent Participant Demographics

Child (N=5)		**Parent (N=5)**	
Sex		Sex	
Male	3	Male	0
Female	2	Female	5
Age (months)		Age (years)	
Min	13	Min	20
Max	39	Max	36
Mean	26	Mean	28.4
Race		Race	
White	2	White	4
Black	2	Black	1
Multiracial	1		
Age at referral to palliative care service (months)		Education level	
Min	0	<High school	1
Max	4	High school	1
Mean	2	Some college	2
		Associate's degree	1
		Bachelor's degree and above	0
		Family annual income	
		Decline to report	2
		$10,000-20,000	1
		$20,000-40,000	2
		$40,000 and above	0

The ability to compare pain scores was very limited, as over all five participants and six sessions, nurses only recorded a FLACC pain score above zero for two different participants during session two. Thus, a paired t-test could only be performed for session two, which was not significant ($t(4) = 1.000$, $p = 0.374$). ANOVA tests of pre-and-post FLACC scores revealed a large clinical effect size ($\eta = 0.25$, $f = 1.000$), but limited presence of data inhibits the utility of that result.

Parent-reported pain data, reported using a visual analog scale within the parent questionnaire, was somewhat limited. Only two questionnaires were completed for session four, and none for sessions five and six. To produce more realistic results, the ANOVA test was performed using parent questionnaire data from sessions one, two, and three only. That ANOVA test did not reveal statistical significance, but did reveal a large clinical effect size for parent-reported pain ($F(2,1)=1.886$, $p = 0.232$, $\eta = 0.386$).

Conclusions

This study has several limitations to acknowledge. Statistical significance is limited by a 20% attrition rate and overall small sample size, especially since the sample was taken from a parent study that is still recruiting participants. Differences arise when nurses use their own observations to score the FLACC pain scale, and when parents report their child's pain.

Despite those limitations, some intriguing results were found. While the presence of nurse-reported pain was limited, a participant's FLACC pain score was never increased after a Reiki session. This study's most promising finding is that parent-reported pain score had a large clinical effect size, which suggests that repeated Reiki sessions may have decreased participants' pain over time.

Overall, this study suggests that Reiki may contribute to pain reduction in pediatric palliative care patients. While it is preliminary, this study provides a methodological foundation for further research on Reiki therapy in pediatrics. Such future inquiry may show that Reiki therapy tangibly benefits young children who require palliative care, especially when used with other complementary and traditional methods.

References

Bowden, D., Goddard, L., & Gruzelier, J. (2010). A randomised controlled single-blind trial of the effects of reiki and positive imagery on well-being and salivary cortisol. *Brain Research Bulletin, 81*(1), 66-72.

Bowden, D., Goddard, L., & Gruzelier, J. (2011). A randomised controlled single-blind trial of the efficacy of reiki at benefitting mood and well-being. *Evidence-Based Complementary and Alternative Medicine : ECAM, 2011*, 381862.

Brown, A., & Clark, J. D. (2015). A parent's journey: Incorporating principles of palliative care into practice for children with chronic neurologic diseases. *Seminars in Pediatric Neurology, 22*(3), 159-165.

Bukowski, E. L., & Berardi, D. (2014). Reiki brief report: Using reiki to reduce stress levels in a nine-year-old child. *Explore (New York, N.Y.), 10*(4), 253-255.

Crane, K. (2011). Pediatric palliative care gains recognition. *Journal of the National Cancer Institute, 103*(19), 1432-1433.

Desai, A. D., Zhou, C., Stanford, S., Haaland, W., Varni, J. W., & Mangione-Smith, R. M. (2014). Validity and responsiveness of the pediatric quality of life inventory (PedsQL) 4.0 generic core scales in the pediatric inpatient setting. *JAMA Pediatrics, 168*(12), 1114-1121.

Eland, J., & Anderson, J. (1977). The experience of pain in children. In A. Jacox (Ed.), Pain: A source book for nurses and other health professionals (pp. 453-473). Boston: Little, Brown.

Fitzgerald, M., & Walker, S. M. (2009). Infant pain management: A developmental neurobiological approach. *Nature Clinical Practice. Neurology, 5*(1), 35-50.

Garra, G., Singer, A. J., Taira, B. R., Chohan, J., Cardoz, H., Chisena, E., et al. (2010). Validation of the wong-baker FACES pain rating scale in pediatric emergency department

patients. *Academic Emergency Medicine : Official Journal of the Society for Academic Emergency Medicine, 17*(1), 50-54.

Institute of Medicine. (2011). *Relieving pain in america A blueprint for transforming prevention, care, education, and research*National Academy of Sciences.

Lee, M. S., Pittler, M. H., & Ernst, E. (2008). Effects of reiki in clinical practice: A systematic review of randomised clinical trials. *International Journal of Clinical Practice, 62*(6), 947-954.

Malviya, S., Voepel-Lewis, T., Burke, C., Merkel, S., & Tait, A. R. (2006). The revised FLACC observational pain tool: Improved reliability and validity for pain assessment in children with cognitive impairment. *Paediatric Anaesthesia, 16*(3), 258-265.

Manworren, R. C. B., & Hynan, L. S. (2003). Clinical validation of FLACC: Preverbal patient pain scale. *Pediatric Nursing, 29*(2), 140.

National Academy of Sciences. (2011). ***Relieving pain in america: A blueprint for transforming prevention, care, education, and research***. Retrieved 10/01, 2017, from http://www.nationalacademies.org/hmd/Reports/2011/Relieving-Pain-in-America-A-Blueprint-for-Transforming-Prevention-Care-Education-Research.aspx

Palermo, T. M., & Holley, A. L. (2013). The importance of the family environment in pediatric chronic pain. *Archives of Pediatrics and Adolescent Medicine, 167*(1), 93-94.

Reid, K., Lander, J., Scott, S., & Dick, B. (2010). What do the parents of children who have chronic pain expect from their first visit to a pediatric chronic pain clinic? *Pain Research and Management, 15*(3), 158-162.

Ring, M. E. (2009). Reiki and changes in pattern manifestations. *Nursing Science Quarterly, 22*(3), 250-258.

Rybczynski, S., Katz, E., Schultz, S., & Salorio, C. (2016). Survey of parental acceptance of massage therapy, energy therapy and acupuncture for their children in the acute pediatric inpatient rehabilitation setting. *Complementary Therapies in Medicine, 27*, 102-107.

Suresh, S., & Shah, R. (2013). Pediatric chronic pain management. *Practical management of pain: Fifth edition* (pp. 449-466).

Thrane, S., & Cohen, S. M. (2014). Effect of reiki therapy on pain and anxiety in adults: An in-depth literature review of randomized trials with effect size calculations. *Pain Management Nursing : Official Journal of the American Society of Pain Management Nurses, 15*(4), 897-908.

Thrane, S. E., Maurer, S. H., Ren, D., Danford, C. A., & Cohen, S. M. (2016). Reiki therapy for symptom management in children receiving palliative care: A pilot study. *The American Journal of Hospice & Palliative Care,*

Thrane, S. E., Wanless, S., Cohen, S. M., & Danford, C. A. (2016). The assessment and non-pharmacologic treatment of procedural pain from infancy to school age through a developmental lens: A synthesis of evidence with recommendations. *Journal of Pediatric Nursing, 31*(1), e23-32

Walker, L. S., & Zeman, J. L. (1992). Parental response to child illness behavior. *Journal of Pediatric Psychology, 17*(1), 49-71.

World Health Organization. (2017). *WHO definition of palliative care.* Retrieved October/01, 2017, from http://www.who.int/cancer/palliative/definition/en/